

**ATTACHMENT B****Amendments to the Specification**

*Please replace the Summary section with the following amended Summary section.*

**SUMMARY OF THE INVENTION**

The present invention ~~as set forth in claim 1~~ is characterized in that, in an expander roll in which a plurality of metallic, cylindrical roll members are attached to an outer periphery of a curved shaft with a bearing disposed between the roll members and the shaft, a ring-shaped elastic packing with which a gap between ends of adjoining, cylindrical roll members is closed is provided at the ends of the roll members, and outer surfaces of both side parts of a part of an outer circumferential surface of the ring-shaped elastic packing that faces the gap between the adjoining, cylindrical roll members are fixed to an inner surface of a cylindrical roll member, whereby the ring-shaped elastic packing is deformed in accordance with a movement in a lengthwise direction of the adjoining, cylindrical roll members.

Various metals, such as a stainless steel and an aluminum alloy, can be used as a material of the cylindrical roll member, in accordance with use conditions and other conditions of the expander roll.

Various elastic materials, such as silicone rubber, fluoro rubber, and foamed polyurethane in addition to NBR, SBR, and IR, can be used as a material of the ring-shaped elastic packing.

The present invention ~~as set forth in claim 2~~ is also characterized in that, concerning the expander roll as set forth in ~~claim 1~~ above, a gap-facing concave portion is formed in the part of the outer circumferential surface of the ring-shaped elastic packing that faces the gap between the adjoining, cylindrical roll members, and outer surfaces of both side parts of the gap-facing concave portion are fixed to inner surfaces, respectively, of the cylindrical roll members each of which is disposed on a side identical to a side of each side part of the outer surfaces, whereby both of the side parts

of the gap-facing concave portion are deformed in accordance with a movement in a lengthwise direction of the adjoining, cylindrical roll members.

Various methods can be used as a means for fixing the outer surfaces of both side parts of the gap-facing concave portion to the inner surfaces of the cylindrical roll members, in addition to a method of using a sealing and bonding agent described later to fix them together. One example of the various methods is to form a concave portion in one of the outer surfaces of both the side parts of the gap-facing concave portion and the inner surfaces of the cylindrical roll members and form a convex portion in the other one so as to engage the concave and convex portions with each other.

Additionally, the width and the depth of the gap-facing concave portion are appropriately set so that both side parts thereof can easily follow the movement of the cylindrical roll members in the lengthwise direction.

The present invention ~~as set forth in claim 3~~ is further characterized in that, concerning the expander roll as set forth ~~in claim 1 or claim 2~~ above, one concave portion or a plurality of concave portions are formed in the outer surfaces of both side parts of the part of the outer circumferential surface of the ring-shaped elastic packing that faces the gap between the adjoining, cylindrical roll members, and both side parts of the part of the outer circumferential surface that faces the gap therebetween are formed like pleats, and outer surfaces of pleat-like portions and the inner surfaces of both the cylindrical roll members are fixed, whereby the pleat-like portions are deformed in accordance with the movement of the cylindrical roll members in the lengthwise direction.

In the present invention, the number of pleat-like portions is appropriately changed in accordance with a thickness of the ring-shaped elastic packing. Like the gap-facing concave portion, the width and the depth of the concave portion are appropriately set so that the pleat-like portions can easily follow the movement of the cylindrical roll members in the lengthwise direction.

The present invention ~~as set forth in claim 4~~ is still further characterized in that, concerning the expander roll as set forth ~~in claim 3~~ above, the pleat-like portion of each

side part of the gap-facing part has its intermediate part between its base and its end, the intermediate part smaller in width than the base and the end.

The present invention ~~as set forth in claim 5~~ is also technically characterized in that, concerning the expander roll as set forth ~~in claim 3~~ above, a bottom corner part of the gap-facing concave portion or of another concave portion is formed like an arcuate concave.

In the present invention, since the bottom corner part of the concave portion is formed especially like an arcuate concave, stress in both side parts of the gap-facing concave portion or in the base of the pleat-like portion can be progressively dispersed.

The present invention ~~as set forth in claim 6~~ is further technically characterized in that, concerning the expander roll as set forth ~~in claim 3~~ above, a fixing operation between the outer surface of the ring-shaped elastic packing or the outer surface of its pleat-like portion and the inner surface of the cylindrical roll member is performed by use of a sealing and bonding agent that has both liquidtightness and bonding properties. A silicone-based liquid gasket, one-component RTV rubber, a silicone-based sealing agent, and an elastic epoxy adhesive can be mentioned as the sealing and bonding agent used in the present invention.

The present invention ~~as set forth in claim 7~~ is still further technically characterized in that, concerning the expander roll as set forth ~~above~~ in claim 6, a groove is formed in the outer circumferential surface of the pleat-like portion, and the sealing and bonding agent is poured into the groove.

The present invention ~~as set forth in claim 8~~ is still further characterized in that, concerning the expander roll as set ~~above~~ forth in claim 1 or claim 2, a likewise ring-shaped flange is provided at each end of the ring-shaped elastic packing; an edge of a sleeve extending in the lengthwise direction of the curved shaft is attached to an inner periphery of each flange; a closed-cell foamed ring is formed to be adjacent to both flanges; a cylindrical spacer and a cleat are provided on a side opposite to the flange of the foamed ring; and the cylindrical spacer and the flange are bonded to both sides of the foamed ring through the sealing and bonding agent.

In the present invention, since the foamed ring is interposed between the flange and the cylindrical spacer, it is possible to obtain liquidtightness and a buffering action when the cylindrical roll rotates around the outer periphery of the curved shaft at high speed.

According to the present invention ~~as set forth in claim 1 and claim 2~~, a ring-shaped elastic packing with which a gap between ends of adjoining, cylindrical roll members is closed is provided inside the ends of the roll members, a gap-facing concave portion facing a gap between the roll members that adjoin each other when necessary is formed in the outer circumferential surface of the ring-shaped elastic packing, and outer surfaces of both side parts of the gap-facing part or outer surfaces of both side parts of the gap-facing concave portion are fixed to inner surfaces, respectively, of the cylindrical roll members each of which is disposed on a side identical to a side of each side part of the outer surfaces, so that both of the side parts of the gap-facing part or both of the side parts of the gap-facing concave portion are deformed in accordance with a movement in a lengthwise direction of the adjoining, cylindrical roll members. Therefore, even when the plurality of cylindrical roll members on the curved shaft repeatedly make a slight reciprocating movement in the lengthwise direction of the roll members in response to its high-speed rotation, the outer circumferential surface of the ring-shaped elastic packing never causes friction with the inner circumferential surface of the cylindrical roll member, and therefore the outer periphery of the ring-shaped elastic packing is prevented from being worn away, and liquidtightness in the cylindrical roll member is reliably obtained over a long period of time.

Therefore, when the expander roll of the present invention is used in a paper-manufacturing process, the expander roll can be used in a wet part, such as a wire part or a press part, as well as in a dry part.

Additionally, as mentioned above, in the expander roll of the present invention, water is not infiltrated from the outside in the wet part, and foreign objects like dust are, of course, prevented from entering, and there is no fear that the grease of a bearing

disposed in the cylindrical roll member will leak out of the cylindrical roll member and infiltrate into a pulp material.

Additionally according to the present invention ~~as set forth in claim 3~~, one concave portion or a plurality of concave portions are formed in the outer surfaces of both side parts of the part of the outer circumferential surface of the ring-shaped elastic packing that faces the gap between the adjoining, cylindrical roll members, and both side parts of the gap-facing part are formed like pleats. Therefore, even when the width of both side parts of the gap-facing part in the ring-shaped elastic packing is widened, both side parts formed like pleats can easily follow the movement of the cylindrical roll member, and water is prevented through some stages from infiltrating thereinto by being formed like pleats. Therefore, advantageously, liquidtightness in the cylindrical roll member is improved.

Further according to the present invention ~~as set forth in claim 4~~, the pleat-like portion of each side part of the gap-facing part has its intermediate part between its base and its end that is smaller in width than the base and the end. Therefore, it is possible to more easily follow the movement of the cylindrical roll member.

Still further according to the present invention ~~as set forth in claim 5~~, a bottom corner part of the gap-facing concave portion or of another concave portion is shaped like an arcuate concave. Therefore, when following both side parts of the gap-facing concave portion or its pleat-like portion, the stress of the base of these is dispersed. As a result, advantageously, physical fatigue in this part is restricted, and the form of the ring elastic packing is maintained over a long period of time.

Still further according to the present invention ~~as set forth in claim 6~~, a fixing operation between the outer surfaces of the pleat-like portions in both sides of the gap-facing part of the outer surface of the ring-shaped elastic packing and the inner surface of the cylindrical roll member is performed by use of a sealing and bonding agent that has both liquidtightness and bonding properties. Therefore, liquidtightness in the cylindrical roll member is further improved.

The present invention as particularly set forth ~~in claim 7~~ has a structure in which a groove is formed in the outer circumferential surfaces of both side parts of the gap-

facing part or in the outer circumferential surface of the pleat-like portion, and the sealing and bonding agent is poured into the groove so that the outer circumferential surfaces of both side parts of the gap-facing part or the outer circumferential surface of the pleat-like portion can be fixed to the inner circumferential surfaces of both cylindrical roll members. Therefore, integration between the outer surface of the ring-shaped elastic packing and the inner surface of the cylindrical roll member can be easily obtained, and water can be prevented, through some stages, from infiltrating, thereby ensuring the liquidtightness.

The present invention as additionally further set forth in ~~claim 8~~ has a structure in which a similarly ring-shaped flange is provided at each end of the ring-shaped elastic packing; an edge of a sleeve extending in the lengthwise direction of the curved shaft is attached to an inner periphery of each flange; a closed-cell foamed ring is formed to be adjacent to both flanges; and a cylindrical spacer and a cleat are provided on a side opposite to the flange in the foamed ring. Therefore, the foamed ring is deformed in accordance with a slight movement in the lengthwise direction of the cylindrical roll members, and water is prevented from infiltrating also by this foamed ring. As a result, a double waterproof structure is obtained in cooperation with liquidtightness created by the ring-shaped elastic packing.